WHAT IS CLAIMED IS:

1. An analog to digital converter comprising:

an array of gain amplifiers connected to reference voltages and to an input signal;

a first amplifier array receiving outputs of the array of gain amplifiers;

a second amplifier array, wherein each amplifier in the first amplifier array is connected to at least two amplifiers of the second amplifier array;

a third amplifier array, wherein each amplifier in the second array is connected to only two amplifiers of the third amplifier array; and

an encoder converting outputs of the third amplifier array to an N-bit digital signal representing the input signal.

2. The analog to digital converter of claim 1, wherein alternating amplifiers of the second amplifier array have differential inputs that are connected to inputs of opposite polarity of adjacent amplifiers of the second amplifier array.

3. The analog to digital converter of claim 2, wherein alternating amplifiers of the third amplifier array have differential inputs that are connected to inputs of opposite polarity of adjacent amplifiers of the third amplifier array

4. The analog to digital converter of claim 1, wherein alternating amplifiers of the third amplifier array have differential inputs that are connected to inputs of opposite polarity of adjacent amplifiers of the third amplifier array.

5. The analog to digital converter of claim 1, wherein the first, second and third amplifier arrays further each includes a first edge amplifier,

wherein the first edge amplifier of the second amplifier array only takes an output of the first edge amplifier of the first amplifier array as an input, and

wherein the first edge amplifier of the third amplifier array only takes an output of the first edge amplifier of the second amplifier array as an input.

6. The analog to digital converter of claim 5, wherein the first, second and third amplifier arrays further each includes a second edge amplifier,

wherein the second edge amplifier of the second amplifier array only takes an output of the second edge amplifier of the first amplifier array as an input, and

wherein the second edge amplifier of the third amplifier array only takes an output of the second edge amplifier of the second amplifier array as an input.

7. The analog to digital converter of claim 1, wherein the first, second and third amplifier arrays further each includes a first edge amplifier,

wherein an output of the first edge amplifier of the first amplifier array in only connected to an input of the edge amplifier of the second array, and

wherein an output of the first edge amplifier of the second amplifier array in only connected to an input of the edge amplifier of the third array.

8. The analog to digital converter of claim 1, wherein the amplifiers that are connected to a particular amplifier in the second array have at least one amplifier of the first array between them.

9. The analog to digital converter of claim 1, wherein each amplifier in the first amplifier array is connected to only two amplifiers of the second amplifier array.

10. An analog to digital converter comprising:

an array of gain amplifiers connected to reference voltages and to an input signal;

a first amplifier array receiving outputs of the array of gain amplifiers;

a second amplifier array connected to outputs of the first amplifier array in an interleaved manner;

a third amplifier array connected to outputs of the second amplifier array; and

an encoder converting outputs of the third amplifier array to an N-bit digital signal representing the input signal.

11. The analog to digital converter of claim 10, wherein inputs of the amplifiers of the second amplifier array have differential inputs that are connected to the outputs of amplifiers of the first amplifier array using capacitive averaging.

12. The analog to digital converter of claim 10, wherein the third amplifier array is connected to the outputs of the second amplifier array in an interleaved manner.

13. The analog to digital converter of claim 12, wherein inputs of the amplifiers of the third amplifier array have differential inputs that are connected to the outputs of amplifiers of the second amplifier using capacitive averaging.

14. The analog to digital converter of claim 10, wherein alternating amplifiers of the second amplifier array have differential inputs that are connected to inputs of opposite polarity of adjacent amplifiers of the second amplifier array.

15. The analog to digital converter of claim 10, wherein alternating amplifiers of the third amplifier array have differential inputs that are connected to inputs of opposite polarity of adjacent amplifiers of the third amplifier array.

16. The analog to digital converter of claim 10, wherein the first amplifier array includes a first amplifier, a second amplifier and a third amplifier,

wherein the first and third amplifiers each include a differential transistor pair whose sources are connected to a current sources, whose drains are each connected to a supply voltage through a corresponding resistor and whose gates are each connected to corresponding input capacitors,

wherein the second amplifier includes two cross-connected differential transistor pairs whose sources are connected to a current source, whose drains are each connected to the supply voltage through a corresponding resistor and whose gates are each connected to corresponding input capacitors of the first and third amplifiers of same polarity inputs.

17. The analog to digital converter of claim 10, wherein the first, second and third amplifier arrays further each includes a first edge amplifier,

wherein the first edge amplifier of the second amplifier array only takes an output of the first edge amplifier of the first amplifier array as an input, and

wherein the first edge amplifier of the third amplifier array only takes an output of the first edge amplifier of the second amplifier array as an input.

18. The analog to digital converter of claim 17, wherein the first, second and third amplifier arrays further each includes a second edge amplifier,

wherein the second edge amplifier of the second amplifier array only takes an output of the second edge amplifier of the first amplifier array as an input, and

wherein the second edge amplifier of the third amplifier array only takes an output of the second edge amplifier of the second amplifier array as an input.

19. The analog to digital converter of claim 10, wherein the first, second and third amplifier arrays further each includes a first edge amplifier,

wherein an output of the first edge amplifier of the first amplifier array in only connected to an input of the edge amplifier of the second array, and

wherein an output of the first edge amplifier of the second amplifier array in only connected to an input of the edge amplifier of the third array.

20. An analog to digital converter comprising:

an array of gain amplifiers connected to reference voltages and to an input signal;

a first amplifier array receiving outputs of the array of gain amplifiers;

a second amplifier array connected to outputs of the first amplifier array

a third amplifier array connected to outputs of the second amplifier array in an interleaved manner; and

an encoder converting outputs of the third amplifier array to an N-bit digital signal representing the input signal.

21. The analog to digital converter of claim 20, wherein the second amplifier array is connected to the first amplifier array in an interleaved manner.

22. An analog to digital converter comprising:

an array of gain amplifiers differentially connected to reference voltages and to an input signal;

a first amplifier array receiving differential outputs of the array of gain amplifiers;

a second plurality of amplifiers, wherein each amplifier in the first plurality is connected to outputs of only two amplifiers of the second plurality of amplifiers;

a third plurality of amplifiers, wherein each amplifier in the second plurality of amplifiers is connected to outputs of at least two amplifiers of the third plurality of amplifiers; and

an encoder converting outputs of the third plurality of amplifiers to an N-bit digital signal corresponding to the input signal.

23. The analog to digital converter of claim 22, wherein each amplifier in the second plurality is connected to outputs of only two amplifiers of the third plurality of amplifiers.

24. The analog to digital converter of claim 22, wherein alternating amplifiers of the second plurality of amplifiers have differential inputs that are connected to inputs of opposite polarity of adjacent amplifiers of the second plurality of amplifiers.

25. The analog to digital converter of claim 24, wherein alternating amplifiers of the third plurality of amplifiers have differential inputs that are connected to inputs of opposite polarity of adjacent amplifiers of the third plurality of amplifiers.

26. The analog to digital converter of claim 22, wherein alternating amplifiers of the third plurality of amplifiers have differential inputs that are

connected to inputs of opposite polarity of adjacent amplifiers of the third plurality of amplifiers.

27. The analog to digital converter of claim 22, wherein the first, second and third pluralities further each includes a first edge amplifier,

wherein the first edge amplifier of the second plurality of amplifiers only takes an output of the first edge amplifier of the first plurality of amplifiers as an input, and

wherein the first edge amplifier of the third plurality of amplifiers only takes an output of the first edge amplifier of the second plurality of amplifiers as an input.

28. The analog to digital converter of claim 27, wherein the first, second and third pluralities further each includes a second edge amplifier,

wherein the second edge amplifier of the second plurality of amplifiers only takes an output of the second edge amplifier of the first plurality of amplifiers as an input, and

wherein the second edge amplifier of the third plurality of amplifiers only takes an output of the second edge amplifier of the second plurality of amplifiers as an input.

29. The analog to digital converter of claim 22, wherein the first, second and third pluralities further each includes a first edge amplifier,

wherein an output of the first edge amplifier of the first plurality of amplifiers in only connected to an input of the edge amplifier of the second plurality of amplifiers, and

wherein an output of the first edge amplifier of the second amplifier plurality of amplifiers in only connected to an input of the edge amplifier of the third plurality of amplifiers.

30. An analog to digital converter comprising:

an array of gain amplifiers differentially connected to reference voltages and to an input signal;

a first amplifier array receiving differential outputs of the array of gain amplifiers;

a second plurality of amplifiers connected to the first plurality of amplifiers in an interleaved manner;

a third plurality of amplifiers connected to the second plurality of amplifiers; and

an encoder converting outputs of the third plurality of amplifiers to an N-bit digital signal representing the input signal.

31. The analog to digital converter of claim 30, wherein the third plurality of amplifiers is connected to the second plurality of amplifiers in an interleaved manner.

32. The analog to digital converter of claim 30, wherein alternating amplifiers of the second plurality of amplifiers have differential inputs that are connected to inputs of opposite polarity of adjacent amplifiers of the second plurality of amplifiers.

33. The analog to digital converter of claim 32, wherein alternating amplifiers of the third plurality of amplifiers have differential inputs that are connected to inputs of opposite polarity of adjacent amplifiers of the third plurality of amplifiers.

34. The analog to digital converter of claim 30, wherein alternating amplifiers of the third plurality of amplifiers have differential inputs that are connected to inputs of opposite polarity of adjacent amplifiers of the third plurality of amplifiers.

35. The analog to digital converter of claim 30, wherein the first, second and third pluralities further each includes a first edge amplifier,

wherein the first edge amplifier of the second plurality of amplifiers only takes an output of the first edge amplifier of the first plurality of amplifiers as an input, and

wherein the first edge amplifier of the third plurality of amplifiers only takes an output of the first edge amplifier of the second plurality of amplifiers as an input.

36. The analog to digital converter of claim 35, wherein the first, second and third pluralities further each includes a second edge amplifier,

wherein the second edge amplifier of the second plurality of amplifiers only takes an output of the second edge amplifier of the first plurality of amplifiers as an input, and

wherein the second edge amplifier of the third plurality of amplifiers only takes an output of the second edge amplifier of the second plurality of amplifiers as an input.

37. An analog to digital converter comprising:

an array of gain amplifiers connected to reference voltages and to an input signal;

a plurality of amplifier arrays "a", "b", "c" . . . "n" arranged in a cascade, wherein the amplifiers in the array "a" are connected to outputs of the array of gain amplifiers;

a plurality of connections between consecutive arrays of the plurality of amplifier arrays "a", "b", "c" . . . "n", wherein the connections are configured for m_a x m_b x m_c x . . . m_n x averaging of the reference voltages, m_a, m_b , m_c . . . m_n representing an averaging factor of the corresponding amplifier array; and

an encoder connected to outputs of the "n" amplifier array that converts the outputs to an N-bit digital signal representing the input voltage.

38. An analog to digital converter comprising:

an array of gain amplifiers connected to reference voltages and to an input signal;

a first amplifier array receiving outputs of the array of gain amplifiers;

a second amplifier array, wherein each amplifier in the second amplifier array is connected to at least two amplifiers of the first amplifier array;

a third amplifier array, wherein each amplifier in the third array is connected to at least two amplifiers of the second amplifier array,

wherein an output of each amplifier of the first array has only one path to a corresponding amplifier of the third array; and

an encoder converting outputs of the third amplifier array to an N-bit digital signal representing the input signal.

39. An analog to digital converter comprising:

an array of gain amplifiers connected to reference voltages and to an input signal;

a first amplifier array receiving outputs of the array of gain amplifiers;

a second plurality of amplifiers, wherein each amplifier in the first plurality of amplifiers is connected to only two amplifiers of the second plurality of amplifiers;

a third plurality of amplifiers, wherein each amplifier in the third plurality of amplifiers is connected to at least two amplifiers of the second plurality of amplifiers; and

an encoder converting outputs of the third plurality of amplifiers to an N-bit digital signal corresponding to the input signal.

40. An analog to digital converter comprising:

an array of gain amplifiers connected to reference voltages and to an input signal;

a plurality of amplifier arrays "a", "b", "c" . . . "n" arranged in a cascade, wherein the amplifiers in the array "a" are connected to outputs of the array of gain amplifiers;

wherein connections between consecutive arrays are configured for m_a x m_b x m_c x . . . m_n x averaging of the reference voltages, m_a, m_b , m_c . . . m_n representing an averaging factor of the corresponding amplifier array,

wherein "$m_1 = m_a$ x m_b x m_c . . . m_n x" represents an averaging of the "a" amplifier array, "$m_2 = m_b$ x m_c x m_d . . . m_n x" represents an averaging of the "b" amplifier array, and so on,

wherein a number of amplifiers X_a that are "skipped" in the "a" amplifier array is

$$X_a = \frac{m_1}{m_a} - 1,$$

wherein a number of amplifiers X_b that are "skipped" in the "b" amplifier array is

$$X_b = \frac{m_2}{m_b} - 1,$$

and so on; and

an encoder connected to outputs of the "n" amplifier array that converts the outputs to an N-bit digital signal representing the input voltage.